

AMATEUR SATELLITE REPORT

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Progress Is Being Made In Integrating Phase 3C

Progress towards a September 21, 1986 launch of Phase 3C is good according to Joe Flaska, WBØRLY, reporting from the Golden, Colorado integration facility. Construction activities are proceeding in parallel at Golden and at the main facility of AMSAT DL at Marburg, West Germany. AMSAT and AMSAT DL are teamed in the Phase 3C project.

An AMSAT-DL videotape documentation crew will arrive in Colorado around February 28 to record events the following weekend as part of their overall documentation effort. The thermal vacuum test, previously scheduled for March has now been re-scheduled for May 23. A team from AMSAT DL will arrive about May 13 to install the B, L and L-RUDAK transponders in the space frame. The test will take place at Martin-Marietta, Denver. Following the thermal vacuum test, the modules will be removed and potted with a special compound to improve their reliability. They will then be shipped to Germany for shake/vibration testing.

Other activities at the Golden, Colorado lab recently included the arrival from Germany of the Helium bottle; construction of a new battery box to accommodate the new, larger cells; wiring harness test and connector verification; main fuel tank sensor installation and painting; coaxial cable fabrication; 70 cm antenna fabrication completion and receipt of the liquid ignition unit box. The Mode S transponder construction continues albeit somewhat behind schedule and the LIU has some problems that need to be resolved. Vice President Jan King, W3GEY, is said to be generally pleased with progress and concentrating on getting the lagging efforts back on track.

Challenger Investigation Focuses On Solid Rocket Booster

The President's Commission investigating the explosion of the Shuttle Challenger January 28 is focusing on the solid rocket booster, SRB, and the possibility that either cold weather or a leak from the adjacent cryogenic tanks affected the viability of the seals between sections of the huge rocket. Newly released photographs show a strange puff of black smoke emanating from the suspect joint just after ignition. Experts have said this black smoke is from the burning of the O-rings, the seals and lubricants at the joint. This

would seem to indicate the ill-fated mission, which killed seven astronauts in the world's worst space disaster, was in trouble from the start.

Investigators are now looking into the possibility that leaked cryogenic fluids came in contact with the SRB casing. If so, this might account for a failure in the critical seals. Some 58 seconds into the flight a plume of flame is seen in films to burst through the seam. This 5,600 degree Fahrenheit flame is thought to have played a major role in the explosion.

Reports of intense discussions between the manufacturer of the SRBs, Morton-Thiokol, and NASA managers have introduced uncertainty into examination by the commission of the discussions which led up to the decision to launch. Top NASA officials including Associate Administrator Jesse Moore, the top Shuttle official, told the President's Commission they were not told of Morton-Thiokol's grave concerns over launching in the extremely low temperatures experienced the night of January 27.

Meanwhile, Rear Admiral Richard Truly, a former astronaut who flew the Shuttle, has been *named to replace* Moore as Shuttle Program Manager. According to NASA, Moore had previously been assigned to take over the Johnson Space Center when its head, Neil Hutchinson, resigned late last year. Until the appointment of Truly, Moore had been wearing two hats; that of Center Director at JSC and Shuttle Manager. Until his appointment to the Shuttle Program Admiral Truly had been Commander of the Navy's Space Command with responsibility for the Navy's communication and reconnaissance space assets.

The next three missions of the Shuttle, including the one carrying Dr. Ron Parise, WA4SIR, and several of his ASTRO experiments, have been scrubbed. It is not known if they will be re-scheduled. A NASA official has stated that if a redesign of the SRB seals is required, it will take between 4 months and 18 months to accomplish.

The back-up to Teacher-In-Space Christa McAuliffe, Barbara Morgan, has said she is ready to fly the next available Shuttle mission whenever NASA feels the present problems have been repaired. The Japanese National Space Agency, NASDA, has announced the institution of a \$100,000 scholarship program for the people of Concord, N.H., home of McAuliffe. NASDA said the scholarship fund would be financed by the Japanese people in honor of the memory of teacher McAuliffe and the ideals she represented.

ESA Launches Two Satellites After Long Delay

ESA, the European Space Agency, successfully launched two satellites to polar orbits early on February 22 marking the return to operational status of its Ariane-1 launcher. The V16 launch from Kourou, French Guiana, placed the French SPOT and the Swedish VIKING satellites in polar orbits.

This was the first time any Ariane had attempted a polar launch and was the first ESA launch in more than 5 months. The Ariane program suffered a major setback last September 12 when the V15 launch failed destroying the rocket and payload. The European ECS-3 and GTE's Spacenet F3 satellites were destroyed when the Ariane-1 V15 third stage failed to properly ignite. Range safety personnel were forced to destroy the stage prior to injection of the payload into geo-synchronous transfer orbit.

The 22 February launch was designed to place the SPOT, an earth resources imaging satellite and VIKING, a research satellite, into low earth, sun-synchronous orbits 832 km high inclined 98 degrees. However, while SPOT will stay in its 832 km circular orbit, VIKING will boost itself into an elliptical orbit 822 km by 14,000 km inclined 98.7 degrees. VIKING will probe the ionosphere, geomagnetic field, plasma waves and other phenomenon of interest.

The successful V16 launch is the last in the the Ariane-1 program. V17 begins the era of the Ariane-2/3, enhanced versions of Ariane-1 with strap-on rockets giving the launcher greater payload capacity. V17, an Ariane-3 configuration, will also be the first to use ESA's new ELA-2 launch pad at Kourou. The two launch pads working in parallel will increase the launch rate capability of ESA's South American facility to its highest level ever. V17 is scheduled to lift off next month with two large communications satellites as the payload. They are GTE's Spacenet GSTAR 2 and Brazil's Brasilsat S2.

The first flight of the big Ariane-4, mission V21, which includes ESA's Meteosat, the APEX 401 and AMSAT's Phase 3C, is now scheduled for September, 1986.

Russians Launch New Space Station

A very large space station called MIR (peace) was launched by the Soviet Union Thursday, 19 February. Amateur Radio may eventually play a part in the multi-year mission of this spacecraft. MIR will be a manned space station forming the core of the Soviet manned space effort for the next several years. It is a successor to the well-traveled Salyut-7 space station. The first crew is due to launch to MIR after station check-out; perhaps in a week or so. It is likely MIR will be continuously manned thereafter. It is thought MIR has both scientific and military missions. Six docking ports will allow the basic spacecraft to be built up by the addition of permanent or temporary modules attached to it.

The first Amateur Radio activity associated with MIR may be the deployment of ISKRA-4, a small satellite planned for manual deployment sometime early in MIR's operational life. Prior ISKRAs have included Amateur Radio equipment. It is not known if ISKRA-4 has any Amateur Radio equipment aboard. A possible collaboration between the Moscow

Aviation Institute and DOSAAF (the organizations responsible for prior ISKRAs and RSs, respectively) could mean a Mode A transponder may aboard ISKRA-4.

Additionally, several Cosmonauts are known to be licensed Amateurs. Ham-In-Space operation from MIR during its several year operational life is thought likely in view of preliminary discussions held last year according to reliable sources.

By February 21 the spacecraft remained in a rather low, somewhat more eccentric orbit than usual leading to the belief that further, even substantial orbital adjustments were imminent. The 307 X 185 km orbit is inclined 52 degrees and has a nodal period of only 88.87 minutes. Its anomalistic period was 89.15 minutes.

New AO-10 Schedule Now In Effect

The following AO-10 operating schedule will be in effect until early March. The satellite is now in condition green but poor sun angles and eclipses persist.

Here is the schedule:

Mode B	MA 040 to 199
Mode L	MA 200 to 216
Mode B	MA 217 to 230
Off	MA 231 to 039

The attitude has been adjusted to 231 degrees longitude and -8 degrees latitude. The omni antenna is in use from MA 240 to 044. As always, it's a good idea to monitor to the beacon for advisories on schedule changes.

RS Launch Rumors "Premature"

Anticipation of an imminent launch and observation of telemetry from a veteran RS satellite precipitated rumors of the launch of RS-9 recently. However, these reports seem to have been premature. According to G3IOR, who normally maintains regular contact with UA3CR, there have been none of the usual hints that a launch has occurred. Rather, says G3IOR, the launch of RS-9 appears scheduled for late May.

Several stations reported hearing new telemetry on 29.400 MHz, a frequency often used by the Russians for their current generation of Radio Sputniks. However, this telemetry has since been attributed to RS-1. RS-1 has been heard sporadically since it ceased regular operation in 1980.

The evidence that the telemetry currently observed originates with RS-1 is based on numerous reports of the telemetry word "5015". This word had previously been positively correlated with RS-1. As recently as four weeks ago VE5XU had reported the re-activation of RS-1.

RS-9 is expected to include a Mode A transponder. The uplink will be on 2 meters in the 145.86 MHz range. The downlink will be from 29.36 to 29.40 MHz. A beacon will be placed at 29.402 MHz. If a robot transponder is aboard, its downlink will be at 29.320 MHz. The robot uplink frequency is unclear at this time.

Mode JL Frequencies Corrected

The frequencies detailed for the Mode J input to the Phase 3C Mode JL transponder in ASR 117 were incorrect. The correct frequencies for the Mode J uplink to the JL transponder are:

J Uplink:	145.82 - 145.86 MHz	Option 1
J Downlink:	435.93 - 435.97 MHz	
or		
J Uplink:	144.44 - 144.48 MHz	Option 2
J Downlink:	435.93 - 435.97 MHz	

This results in an overlap between the downlinks from the 24 cm (L) and 2 meter (J) uplinks. The overlap includes the entire J downlink at the high end of the L downlink band. We apologize for the error.

Short Bursts

- Expect an AMSAT Mini-Board meeting at the Dayton Hamvention this April.
- Dallas-Fort Worth Amateurs will host the AMSAT Fourth Annual Space Symposium and Autumn Board Meeting for 1986. The Symposium will be on Saturday, November 8 with the Board meeting on Sunday, November 9. Al Brinkerhoff, WB5PMR, and Keith Pugh, W5IU, are among more than a dozen launching meeting preparations.
- Jay Holladay, W6EJJ, has been elected ARRL First Vice President. Jay, an employee and Program Manager at NASA's Jet Propulsion Laboratory, Pasadena, has been an active AMSAT member and valiant supporter for years. He helped found the Amateur Satellite Service Council (ASSC) in the 1970s. Re-elected by the ARRL Board were President Larry Price, W4RA, and Executive Vice President Dave Sumner, K1ZZ.
- Project OSCAR officials have announced all orders for the 1986 Amateur Satellite Orbital Predictions have been mailed. All new orders are being filled as they arrive.

- AMSAT is now making available AMSAT OSCAR 10 ground track templates for use with the ARRL OSCAR-LOCATOR. The template consists of a paper copy detailing in proper scale the movements of AO-10 for the period of apogee plus and minus 5.5 hours. With AO-10, updates every three months or so are required. It is scaled for use with the ARRL OSCARLOCATOR only. A copy may be obtained free of charge for a business sized SASE to: AMSAT, AO-10 Ground Track, P.O. Box 177, Warwick, N.Y. 10990
- In early March AMSAT OSCAR 10 will reach its maximum southerly extent. With the slow precession of the orbital plane, apogee has been progressing south since launch. On about March 3 it will reach its maximum southerly travels when it reaches 26.2 degrees South, equal to its orbital inclination. Thereafter apogee will move to the north reaching the equator in January 1987 and its most northerly latitude, 26.2 degrees north, in early 1988.
- Andy MacAllister points out in his OSCAR Notes #55 that Yaesu is looking for some indication from owners of the FT-726R VHF/UHF radio that there exists a market for new modules. In particular, if you own a -726 and would like to see Yaesu market 220 MHz and 1.2 GHz modules, you should let Yaesu know. Simply send a letter or QSL card to express your desires to: Yaesu, 6851 Walthall Way, Paramount, CA, 90723, Attention Chip Margelli. It may have the desired effect!

MARCE Telemetry Termed "Excellent"

Ed Stluka, W4QAU, says the MARCE telemetry received from numerous observers around the world is "excellent and provides a very good picture of the the experiments in progress." W4QAU is the lead investigator of the Marshall Amateur Radio Club Experiment. He said telemetry analysis is proceeding well with a nearly complete coverage record afforded by the high quality, widely dispersed observation sites established by Amateurs to support this effort. MARCE flew on Shuttle Columbia for a 6 day mission beginning January 12, 1986.

Orbit Predictions

Satellite	MIR
Catalog number	16609
Epoch time:	86052.12474285
Fri Feb 21 02:59:37.782 1986 UTC	
Element set:	2
Inclination:	51.6125 deg
RA of node:	114.4345 deg
Eccentricity:	0.0092279
Arg of perigee:	94.7213 deg
Mean anomaly:	266.0304 deg
Mean motion:	16.15269732 rev/day
Decay rate:	0.00981159 rev/day ²
Epoch rev:	20
Semi major axis	6611.090 km
Anom period:	89.149197 min
Apogee:	307.001 km
Perigee:	184.988 km
Ref perigee:	2973.14090263
Fri Feb 21 03:22:53.987 1986 UTC	

Satellite	OSCAR-10
Catalog number	14129
Epoch time:	86043.93955994
Wed Feb 12 22:32:57.978 1986 UTC	
Element set:	226
Inclination:	26.1952 deg
RA of node:	95.4268 deg
Eccentricity:	0.5999629
Arg of perigee:	85.4803 deg
Mean anomaly:	336.5503 deg
Mean motion:	2.05856526 rev/day
Decay rate:	4e-08 rev/day ²
Epoch rev:	2010
Semi major axis	26105.448 km
Anom period:	699.516322 min
Apogee:	35393.745 km
Perigee:	4069.144 km
Ref perigee:	2964.97120239
Wed Feb 12 23:18:31.886 1986 UTC	
Translate freq	581.0047 MHz
Invert:	1
Beacon:	145.8100 MHz

Sunday, February 23, 1986

MIR
Sun Feb 23 00:58:09.709 1986 UTC:
Ascending node at 63.2w
Nodal period: 88.86845 min
Longitude increment:
22.614913 deg w/orbit
Element set 2, epoch:
Fri Feb 21 02:59:37.782 1986 UTC

AO-10 Apogees

The first apogee of each UTC day with SSP.

Day	Date	Time	Latitude	Longitude	Arg. Per.
Sun	23Feb	09:58:08	26.2s	300.7w	88.0
Mon	24Feb	09:17:10	26.2s	291.3w	88.3
Tue	25Feb	08:36:12	26.2s	281.9w	88.6
Wed	26Feb	07:55:14	26.2s	272.4w	88.8
Thu	27Feb	07:14:16	26.2s	263.0w	89.1
Fri	28Feb	06:33:18	26.2s	253.6w	89.3
Sat	01Mar	05:52:20	26.2s	244.2w	89.6

PSK Display S/W Offered

Jim Miller, G3RUH, has developed a program to allow real-time display of AO-10 PSK telemetry on the advanced SPECTRUM model of the Sinclair line of computers. The Sinclair is one of the most popular in Europe, especially England. According to Jim, the program has separate modes for telemetry and text blocks and any screen can be dumped to a printer. The software must be used with the SPECTRUM computer and requires the G3RUH PSK demodulator as described in April, 1985 HAM RADIO. Two programs are supplied on tape. One inputs decoded data from the RS-232C port of your "Interface-1" connector; the alternative takes the data from the "ear" socket. The software may be saved to microdrive or disk. Cost is £7.50 UK, £8 Europe and £9 elsewhere. Available from AMSAT-UK, London, E12 5EQ, England.

GOES Weather Satellite

John DuBois, W1HDX, is the only Amateur in the world who is currently monitoring the GOES weather satellite on homebrew equipment. Here are some results John sent us recently. These photos result from complex demodulation and processing of the digital data stream. The signal originates at S-band from GOES at geo-synchronous orbit. Images are stored in a 512 x 512 x 6 bit image buffer at W1HDX.



The hemisphere.

Enhanced Commodore Tracking Program Announced

Vic Ruebhausen, W6WNK, has announced an enhanced version of his famous VR-85 satellite tracking program is now available from the AMSAT Software Exchange. According to Vic, the new version of his VR-85, designed to run on the Commodore 64 computer, the most popular among Amateurs, combines the special graphics of the original version but adds some additional features. New features include printouts of displays and tracking from up to 26 different cities, Vic says. In addition, Vic has teamed up with AMSAT Software Exchange Manager Bob McGwier, N4HY, to develop a version of Bob's QUIKTRAK program for the C-64. Both the new, enhanced VR-85 and the C-64 version of QUIKTRAK are available on a single diskette from the AMSAT Software Exchange, P.O. Box 27, Washington, D.C. 20044.



The U.S.



Maximum resolution image of Northern Florida.

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